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that the so-called Araucarioxyla of the earlier Mesozoic have nothing to do with the evolution of the stock from which *Agathis* and *Araucaria* have been derived. *Walchia* and *Voltzia* from the Permian and Trias, moreover, do not present the *Araucarioxylon* type of wood. The situation thus becomes difficult indeed for those who believe the Araucariineae to be the oldest conifers, and to constitute the articulation of the family with the Cordaitales.—E. C. JEFFREY.

Cytology of the Chytridineae.—BALLY,¹² working in STRASBURGER'S laboratory, has added much of importance to our knowledge of the cytology of the Archimycetes. In *Synchytrium taraxaci* the primary nucleus divides, not by mitosis as in *S. decipiens* and *S. puerariae*, which have been investigated by STEVENS and KUSANO, but by a process analogous to nuclear gemmation, in which masses of chromatin originally derived from the nucleolus pass into the cytoplasm as chromidia which later become the basis of the secondary nuclei. While the stages in this process are not fully worked out, there can be little doubt from the figures showing the old primary nucleus still undivided, together with scores of secondary nuclei in the same parasite, but that the description given is substantially correct. These nuclei later divide by mitosis and always have four chromosomes. Curiously enough the conspicuous asters ("karyodermatoplasts") which reconstruct the nuclear membrane in *S. decipiens* and *S. puerariae* appear to be absent from *S. taraxaci*.

BALLY does not follow PERCIVAL¹³ in including *Chrysophlyctis* in *Synchytrium*, but he fully confirms and substantiates PERCIVAL'S account of the remarkable amitoses in the resting sporangia of that plant. Here nuclear gemmation reaches its climax. The extruded chromidia never organize secondary nuclei, but pass unchanged into the zoospores, which are formed in a most peculiar manner, while the remains of the primary nucleus still persist undivided in the center. Here again more details would be very welcome, but it is clear from the figures, together with those of PERCIVAL, that there is something here far different from the ordinary behavior of nuclei, or better of chromatin, for such cysts may be said to have no nuclei, though rich in chromatin.

In *Urophlyctis Rübsaamenii*, amitosis, largely by nuclear gemmation of which figures showing details are presented, appears to be the sole method of nuclear multiplication. The cytological condition of this plant contrasts sharply with that of the two preceding, in that the parasite becomes coenocytic with the beginning of growth. On the basis of such differences he separates the Archimycetes into two series: one essentially uninucleate, including *Synchytrium* and *Chrysophlyctis*; the other coenocytic from almost the beginning, including the Cladochytriaceae, and more doubtfully the Rhizidiaceae

¹² BALLY, WALTER, Cytologische Studien an Chytridinen. Jahrb. Wiss. Bot. 50: 95-156. pls. 1-5. figs. 6. 1911.

¹³ PERCIVAL, JOHN, Potato wart disease: the life history and cytology of *Synchytrium endobioticum* (Schilb.) Percl. Centralbl. Bakt. 25: 440-446. pls. 1-3. 1910.

and Olpidiaceae, with perhaps also the Hyphochytriaceae. He follows PAVILLARD in believing that the Synchytriaceae show most similarity in cytology to the Sporozoa, and were probably derived from them, but he does not commit himself to any opinion concerning the origin of the second group.—ROBERT F. GRIGGS.

Movement of water.—The ascent of water in vessels containing chains of water and air bubbles (Jamin's chain) may take place in one of two ways: either the whole chain moves upward or the water alone moves while the air bubbles are stationary. SCHAPOSCHUIKOFF¹⁴ claims that the physical conditions of a Jamin's chain in the conducting vessels of plants are not such that they prevent the movement of the chain as a whole. Reasoning theoretically, he concludes that the presence of cross walls in the vessels do not hinder such a movement. The bubble just above the cross wall and the one just below are under unequal pressures, the former under reduced pressure owing to the suction from above, and the latter under increased pressure owing to the rise of water below. On account of the increased pressure the bubble below goes into solution, passes through the cross wall, and separates out again under the reduced pressure above. It is assumed that the bubbles arise only from gases dissolved in the water filling the vessel. They separate out when the water consumption by the plant is greater than the supply, causing a reduced pressure in the vessels.

The author constructed a very ingenious apparatus to put the above theoretical conclusions to the test of experimental proof. In his apparatus gas bubbles began to form from the gases in solution when the pressure reached one-half to one-third of an atmosphere in a glass tube corresponding to a conducting vessel in the plant. As soon as a gas bubble reached the cross wall, the filtration of water through the membrane ceased. The manometer soon showed an increased pressure in the tube, due to the continued rise of water from below. After a short time the bubble went into solution and passed through the water-saturated membrane, allowing the filtration of water to continue. The manometer now showed a sinking of pressure again. The passage of the bubbles by the sculpturing of the wall may be explained in a way similar to their passage through the cross walls. As soon as a bubble is held by a thickening in the wall, unequal pressures are set up, causing it to dissolve sufficiently to pass on.—CHAS. O. APPLEMAN.

Chaparral.—A woodland consisting of stunted trees, seldom more than 10 feet, and apparently a response to the peculiar conditions of Southern California, has been studied by PLUMMER,¹⁵ and a report made upon its impor-

¹⁴ SCHAPOSCHUIKOFF, WALK., Sollen die Luftblässchen der sogenannten Jaminschen Kette in den Leitungsbahnen der Pflanzen für immobil gehalten werden? Beih. Bot. Centralbl. 27:438-444. figs 2. 1911.

¹⁵ PLUMMER, FRED G., Chaparral. U.S. Dept. Agric., Forest Service, Bull. 85, pp. 48. 1911.